

# Association of nuts and unhealthy snacks with subclinical atherosclerosis among Children and adolescents with overweight and obesity

Maryam Aghayan<sup>1</sup>, Golaleh Asghari<sup>2,3</sup>, Emad Yuzbashian<sup>3</sup>, Pooneh Dehghan<sup>4</sup>, Hossein Khadem Haghighian<sup>1</sup>, Parvin Mirmiran<sup>3\*</sup> and Maryam Javadi<sup>1,5\*</sup>

## Abstract

**Background:** The process of atherosclerosis begins early in childhood and usually remains asymptomatic until later in life. Carotid intima-media thickness (cIMT) as a marker of subclinical atherosclerosis could identify early vascular alterations. Unhealthy snacks consumption is associated with obesity and other CVD risk factors in children and adolescents. The aim of this study is to investigate the association of different snack substitution and cIMT among overweight and obesity children and adolescents.

**Methods:** A total of 339 participants aged 6 to 13 years with the body mass index Z score  $\geq 1$  based on WHO criteria enrolled in this study. We measured food intakes of participants by validate and reliable food frequency questionnaire (FFQ). Carotid intima media thickness was measured in the common carotid artery with highresolution ultrasonography.

**Results:** After controlling for confounders, intake of nuts had a negative relationship with cIMT ( $\beta = 0.135\text{mm}$  Pvalue = 0.009). Moreover, participants in the last tertile of nuts intake had 59% lower risk of high cIMT in comparison with those who consumed less than 0.64 serving/wk./1000Kcal of nuts (P for trend = 0.010). Substituted of nuts intake with sweet unhealthy snacks had a negative relationship with cIMT ( $\beta = 0.15\text{ mm}$ ). There was no other significant association between energy-dense nutrient-poor solid snacks and cIMT.

**Conclusions:** Our findings emphasize the impact of nuts consumption as a healthy snack on subclinical stages atherosclerosis. Clinical trial studies could examine the effect of different kinds of nuts consumption on cIMT and complications of CVD risk factors.

**Keywords:** Nuts, Snacks, Substitution, cIMT, Atherosclerosis

- 1- Department of Nutrition, School of Health, Qazvin University of Medical Sciences, Qazvin, Iran.
- 2- Department of Clinical Nutrition and Dietetics, Faculty of Nutrition Sciences and Food Technology, National Nutrition and Food Technology Research Institute, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
- 3- Nutrition and Endocrine Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, P.O. Box: 19395-4763, Tehran, Iran.
- 4- Department of Imaging, Research Development Center, Taleghani Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
- 5- Children Growth ResearchCenter, Qazvin University of Medical Sciences, P.O. Box: 34159-14595, Qazvin, Iran.